CLAIMS

1. A condensation heat exchanger associated with a gas or fuel burner (6), which comprises at least one bundle (2) of tubes, which bundle consists of one tube, or a group of tubes arranged end to end, forming a helical winding, in which the wall of the tube or tubes is made of a highly thermally conductive material and has a flattened oval cross section whose major axis is perpendicular, or approximately perpendicular, to that (**X-X'**) of the helix, while the width of the gap separating two adjacent turns is constant and appreciably smaller than the thickness of said cross section, this bundle being mounted fixedly inside a gas-impermeable casing (1), means being provided for circulating a fluid to be heated up, in particular cold water, inside the tube or tubes constituting said bundle (2), this casing (1) having a sleeve (12) for the discharge of the burnt gases, this exchanger thus being arranged such that the hot gases generated by the burner (6) pass radially, or approximately radially, through said bundle via the gaps separating its turns, characterized in that, on the one hand, said casing (1) is made of heat-resistant plastic and in that, on the other hand, it contains means (5; 3-30) for mechanically retaining said bundle in its axial direction, these means being able to absorb the thrust loads resulting from the internal pressure of the fluid which circulates therein and which tends to deform the walls thereof, while preventing these loads from being transmitted to the casing (1).

2. The exchanger as claimed in claim 1, characterized in that it contains a temperature probe (9; 9') borne by said casing (1) which is able to shut down the burner when the temperature prevailing inside the casing, in the vicinity of this probe, exceeds a predetermined threshold.

3. The exchanger as claimed in claim 1 or 2, characterized in that said retaining means comprise a set of ties (5) which extend outside the bundle (2), parallel to the axis (**X-X'**) of the helix, and whose ends are fixed to bearing elements (3, 30) pressing against the two opposed faces of the bundle.

4. The exchanger as claimed in claim 3, characterized in that the bearing element (3, 30) situated at one of the ends of the set of ties is a thin plate, for example in the form of a disk, which is cut out in its central part and consequently has an annular shape.

5. The exchanger as claimed in claim 4, characterized in that said plate (3) serves as a facing which partially closes off an open face of the casing and is fastened to the latter at its periphery, for example by crimping.

6. The exchanger as claimed in claim 5, characterized in that the end portions (50) of the ties pass through said facing (3) in such a way as to project slightly outward, and in that these end portions (50) are threaded such that they allow a door (4) to be mounted removably against the facing by means of nuts (400).

7. The exchanger as claimed in claim 6, characterized in that said door (4) is fixed to the burner (6).

8. The exchanger as claimed in one of claims 4 to 7, characterized in that there are four ties (5) arranged substantially in a square, and in that the bearing elements situated on the opposite side to said facing consist of a pair of arcuate or bent straps (30a, 30b) configured to follow the contour of the bundle (2) as closely as possible and pressing against two diametrically opposed regions thereof, each strap (30a, 30b) being fastened to a pair of neighboring ties (5).

9. The exchanger as claimed in one of claims 1 to 8, characterized in that the plastic constituting the casing (1) is a composite material based on glass-fiber-reinforced or glass-flake-reinforced resin.

10. The exchanger as claimed in claim 9, characterized in that said resin is a compound of polyphenylene oxide, polystyrene and polypropylene.

11. The exchanger as claimed in one of claims 1 to 10, characterized in that it comprises two bundles of coaxial tubes (2a, 2b) situated end to end and connected to one another, one of which serves as a primary exchanger and the other as a secondary exchanger, a deflecting member (7) being sandwiched between these two bundles and thus arranged such that the hot gases generated by the burner pass first through the primary exchanger (2a), passing through the gaps separating its turns from the inside to the outside, and then through the secondary exchanger (2b), passing through the gaps separating its turns from the outside to the inside, after which they are discharged via said sleeve (12).

12. The exchanger as claimed in claim 11, characterized in that said deflector (7) is fixed to said bundles of tubes (2a, 2b).

13. The exchanger as claimed in claim 11, characterized in that, since the burner (6) is mounted inside said bundle serving as primary exchanger (2a), said deflector (7) has a discoid shape and is fixed to the end of this burner, this deflector being equipped at its periphery with a thermally insulating seal which presses against the inside of the bundle.

14. The exchanger as claimed in one of claims 1 to 13, characterized in that said casing (1) consists of two

molded half-shells brought together and secured to one another, for example by welding.

15. The exchanger as claimed in one of claims 1 to 14, characterized in that it contains a shroud (100) arranged outside said bundle (2) and inside said plastic casing (1), this shroud (100) acting as a heat shield which is able to insulate this casing from the heat emitted by the burnt gases.

16. The exchanger as claimed in claim 15, characterized in that said shroud (100) is made from thin stainless steel sheet.

17. The exchanger as claimed in either of claims 15 and 16, characterized in that said shroud (100) is applied to the internal surface of said plastic casing (1) but is kept at a certain distance from the latter, for example by means of a series of bosses (101) stamped into the wall of the shroud (100).

18. The exchanger as claimed in one of claims 15 to 17, characterized in that said shroud (100) consists of two complementary rounded parts (100a, 100b) brought together so as to form an annular casing fitting against the internal surface of said plastic casing (1).

19. The exchanger as claimed in claim 18, characterized in that the mutually facing edges of said rounded parts (100a, 100b) have a row of approximately semicircular or semioval notches (102) which are able to tightly enclose the rectilinear end portions of the tube or tubes constituting the winding when these rounded parts (100a, 100b) are brought together.